REMARKS

Claims 12-24 are pending in the application and stand rejected. The rejection is traversed as set forth below.

O'Connor U.S. 6,501,654 is used to reject claims 12-24. The examiner makes a single statement alleging that O'Connor discloses each and every feature of the claims without providing applicants the benefit of any explanation of the rejection. This makes a response difficult, but applicants will proceed by pointing out some of the exemplary features that are not disclosed in the O'Connor patent.

Claim 12 requires the step of mechanically patterning heat sealable polyimide sheets to define separate device interface, header and channel layers. O'Connor discusses mechanical patterning of polyimide, such as DuPont Kapton® MT, but does not disclose the use of heat sealable polyimide sheets such as the exemplary polyimides discussed in the present specification. The MT film is not a heat sealable film. It is Kapton film with high thermal conductivity (3 x normal Kapton) but has no adhesive properties, either by heat (heat sealable) or solvent. This is why, in O'Connor, the invention is limited to use of adhesive tape, see, e.g., claim 1 that requires "wherein at least one device layer of the microfluidic heat exchange device comprises a self-adhesive tape material." The fact that this feature is an essential part of O'Connor's claim 1, the only independent claim in O'Connor, demonstrates that O'Connor's description does not support omission of a separate adhesive, and therefore fails to disclose the particular heat sealable film that is claimed.

O'Connor's description further confirms that no heat sealable film is used. In the beginning of column 6, O'Connor specifies that "In one embodiment, one or more layers of a device are comprised of single- or double-sided adhesive tape, although other methods of adhering stencil layers may be used. A portion of the tape (of the desired shape and dimensions) can be cut and removed to form channels, chambers, and/or apertures. A tape stencil can then be placed on a supporting substrate, between layers of tape, or between layers of other materials." Use of tape is emphasized. There is a general statement that "other methods of adhering stencil layers may be used", but this vague statement does not disclose a heat sealable film and, in fact, clearly contemplates the necessity of a separate adhesive.

O'Connor's description is consistent with the standard applications of Kapton MT films. In contrast, the present invention describes particular techniques and gives specific exemplary embodiment films for achieving adhesion by a specific arrangement including heat-sealable films (see claim 12) and achieved by the steps of preparing and laminating. The techniques described in the specification permit heat sealing of exemplary Kapton EKJ and KJ films. However, O'Connor presumes the techniques of separate adhesion by tape that are generally used in the art for Kapton films, and particularly Kapton MT films. Consistent with O'Connor's assumption and general knowledge in the art at the time of O'Connor, the preparation of Kapton MT films was achieved with use of a separate adhesive. This information concerning adhering Kapton films generally is still set forth on DuPont's web site, and O'Connor's emphasis on the use of tape indicates that

O'Connor failed to contemplate heat sealing. The DuPont web site presently includes information about Kapton adhesion at http://www.dupont.com/kapton/general/adhesion.html. There, consistent with the understanding indicated in the O'Connor patent, it is stated that "For some applications Kapton® must be bonded to other materials, such as copper foil, which requires the use of an adhesive. Optimum adhesion results are usually obtained from commercially coated Kapton®, which is available from a variety of suppliers."

The invention, in contrast, sets forth a particular method for achieving heat sealing, and this is reflected in the steps of claim 12. Also, the devices in O'Connor have a simple fluid channel structure that is shown in Figs. 7A. O'Connor does not disclose separate interface, header and channel layers, which are partly formed in the mechanically patterning step of claim 12. The remaining steps of claim 12 require preparing the patterned sheets for lamination bonding and laminating the patterned sheets together with a cap layer. There is no lamination bonding discussed in O'Connor, and O'Connor therefore does not disclose the invention of claim 12.

Some examples will be made of selected dependent claims as well. Taking claim 15 as an example, claim 15 requires a 3-dimensional solid model to be used for the mechanical patterning that comprises the computer controlled knife cutting. As discussed in the specification, the alignment of channels is important for mechanical integrity of the device that is formed. The solid model is an important step for realizing particular embodiment heat exchanger devices.

Claim 17 requires that the laminating be realized by vacuum hot pressing. Applicants find no steps for vacuum hot pressing lamination disclosed in the O'Connor reference.

Claim 18 requires that the cap and device interface layer be formed from a higher glass transition temperature polyimide than the header layer and the channel layer. As discussed in the specification, this features permits the reliable formation of heat exchanger devices. Applicants find no discussion of this feature in O'Connor.

The remaining dependent claims are still believed to be separately patentable. Applicants do not make further remarks directed to these claims for the sake of brevity and because the above is believed to be a sufficient response to the outstanding rejection. The examiner is invited to contact the undersigned attorney at the below-listed number if a discussion regarding the case would expedite prosecution. For all the above reasons, reconsideration and allowance of the case is requested.

Respectfully submitted,

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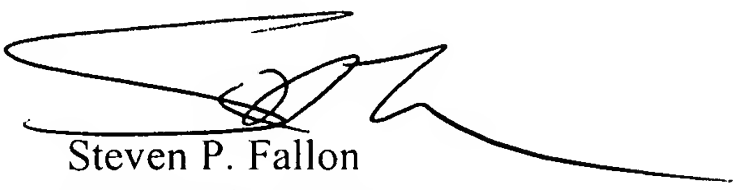
By 

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